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Juvenile Atlantic Salmon
Monitoring Report
Fundy National Park
1988-1990

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INTRODUCTION

A monitoring program of juvenile Atlantic salmon populations was started in 1984 aimed at providing data for the management of this species. Originally both the Point Wolfe and Upper Salmon Rivers were sampled. However, monitoring of the Upper Salmon River was discontinued in 1988 after it was recognized that both rivers would yield similar data.

No sampling was performed in 1986. In 1988 ve changed the sampling sites and methodology to a large extent, therefore, the 1987 rav data are not analyzed here. This report covers information collected from the Point Wolfe River over the 1988-1990 period.

METHODOLOGY

Five permanent sampling plots are electrofished representing the Point Wolfe River pool (2) and riffle (3) habitats. The 1984 procedures, Mercer (1984 unpublished), were revised in 1988 by Woodley and Granger (Appendix I). In addition, starting in 1989, juvenile salmon with fork length of $\leq$ 75 mm were classed 0^+ parr, those between 76 mm and 100 mm 1^+ and those > 100 mm were aged by scale reading.

Field data were analyzed using the "Microfish" software program (Van Deventer and Platts, 1985).

RESULTS AND DISCUSSION

Data collected from 1988 to 1990 are summarized in Tables I, II and III. The number of parr of each age class have been declining steadily from 1988 to 1990 even though the 1989 adult return was higher than the previous years. From Table II we can see that the first few months of life are the most critical as they show the highest mortality (Egg to 0^+ survival). In 1990 this survival dropped to a low 2.2%.

True mortality may be masked, however, by sampling problems such as:

- faulty equipment (batteries)
- concentration or dilution of the parr number in function of the available habitat (water level/discharge)
- number of sweep is actually 4 and yield more or less reliable results
- less than 1% of the rearing habitat is actually sampled

Higher condition factors (bulkier body) in 1989 and 1990 (Table III) tend to indicate that there is more energy stored in all age groups. A lower number of individuals would mean less competition and likely more food available per individual.

More data are needed to follow cohorts survival and subsequently the grilse returns in the future years.

Table I Summary of calculated population parameters for juvenile Atlantic Salmon at permanent sampling sites (total of 5) located in the Point Wolfe River, Fundy National Park, 1988-1990

All Sites	Age Class. 0+	Total Catch	Pop. Est.	S.E.	Density N/100m²	Lower C.I.	Upper C.I.	Area Sample m²
1988	0+	182	227	17.75	14.2	12.0	16.4	1597
1989	0+	72	90	11.39	5.5	4.4	6.8	1650
1990	0+	56	62	4.64	4.0	3.6	4.5	1561
All Sites	1+							
1988	(1+ 2+ 3+)	122	175	27.29	11.0	7.6	14.3	1597
1989	1+	58	63	4.05	3.8	3.5	4.3	1650
1990	1+	20	20	0.57	1.3	1.3	1.4	1561
All Sites	2+							
1989	2+	5	5	1.16	0.3	0.3	0.5	1650
1990	2+	12	12	0.32	0.77	0.77	0.83	1561
All Sites	3+							
1990	3+	1	1	0.0	0.06	0.06	0.06	1561

Table II Cohort Survival in the Point Wolfe River, Fundy National Park, 1987-1990

Cohort[1] of	Eggs[2]/ 100m²	0+	% Survival	1+	% Survival	2+	% resting[3]	3+	% resting
1987	97	14.2	14.6	3.8	26.8	0.77	20.0	---	---
1988	64	5.5	8.6	1.3	23.6	---	---	---	---
1989	186	4.0	2.2	---	---	---	---	---	---
1990	59	---	---	---	---	---	---	---	---

1) Cohort means all fish born in a given year i.e. cohort of 1987: egg 1987, 0+ 1988, 1+ 1989, 2+ 1990, 3+ 1991

2) Modified from Table V in Granger (1990)

3) A proportion died between age 1+ and 2+ and some smolted at age 2+ before sampling explaining the wording % resting (at age 2+)

Table III Mean Lengths, Mean Weights and Condition Factors of Juvenile Atlantic Salmon Captured at Permanent Sampling Sites in the Point Wolfe River, Fundy National Park, 1988-1990

Year	Age Class	N	Condition Factor	Mean Length	S E	L.C.I.	U.C.I.	Mean Weight	S.E.L.	C.I.	U.C.I.	Total Weight (g)
1988	0+	182	.92	61.4	6.46	48.7	74.1	2.2	.89	2.1	2.3	397
1989	0+	72	1.13	58.1	5.37	56.8	59.3	2.3	.91	2.0	2.5	163
1990	0+	56	1.13	60.0	6.46	58.3	61.8	2.5	1.01	2.2	2.8	141
1988	(1+2+3+)	122	.91	104.2	11.56	81.3	127.1	10.2	3.84	9.8	11.2	1285
1989	1+	58	1.15	97.1	9.56	94.6	99.6	11.0	3.99	9.9	12.0	636
1990	1+	20	0.98	107.4	15.32	100.2	114.6	12.7	5.42	10.2	15.2	254
1988	2+	---	---	---	---	---	---	---	---	---	---	---
1989	2+	5	1.18	113.0	6.08	105.4	120.6	17.2	3.56	12.8	21.6	86
1990	2+	12	1.05	146.1	16.09	135.8	156.4	33.2	8.29	27.9	38.5	398
1988	3+	---	---	---	---	---	---	---	---	---	---	---
1989	3+	---	---	---	---	---	---	---	---	---	---	---
1990	3+	1	1.21	141.0	---	---	---	34.0	---	---	---	34

N : number of individuals measured
S.E. : standard error
L.C.I.: lower confidence interval (95%)
U.C.I.: upper confidence interval (95%)

RECOMMENDATIONS

1. Replace old batteries to insure that sampling is not jeopardized. Drain the battery fully before recharging to prevent battery memory problems.

2. Increase the number of sweeps from 4 to 6 to obtain more reliable results.

REFERENCES

Granger, F., 1990. **Salmon Census, Fundy National Park, 1990.** Resource Conservation, Fundy National Park, 10pp.

Van Deventer, J.S., and W. S. Platts, 1985. **A Computer Software System for Entering, Managing and Analyzing Fish Capture Data from Streams.** USDA Forest Service, Intermountain Research Station. Note INT-352.

Appendix I

TERMS OF REFERENCE

FOR

ELECTROFISHING FOR JUVENILE ATLANTIC SALMON

IN THE POINT WOLFE RIVER

FUNDY NATIONAL PARK

BACKGROUND

Atlantic Salmon (Salmo salar) were re-introduced as fall fingerlings to the Point Wolf River starting in 1982. Returning adults were first recorded in 1985.

In order to determine the success of the re-introduction, juvenile salmon population densities, ages, weights, and lengths were determined in selected plots. The plots were sampled by electrofishing and were selected to be representative of the whole river.

The future management options for the Point Wolfe River include (1) a benchmark river for research and public education with no harvest; (2) controlled harvest up to full escapement and; (3) controlled harvest along selected sections of river. Whichever option is selected, knowledge of juvenile densities, age, length and weight are required to (A) predict adult returns (B) monitor the benchmark population and (C) monitor the re-introduction program.

This terms of reference is a modification of one presented by Mercer (1985) and reflects changes required in a recent salmon management plan (Granger et al, in mannus).

REQUIRED METHODS:

Sampling Period: August 10-31, yearly

# of Plots: 5, all on the Point Wolfe River

Plot Descriptions: All plots are 300 m^2 as a minimum size and cross the entire river if possible.
- plots will be representative of 3 riffle zones and 2 pool zone habitats.
- plots should be marked with permanent stakes and the same plots sampled yearly.
- plots should all be of uniform habitat

Plot Locations:
- (1) 400 m upstream from Point Wolfe Bridge - riffle
- (2) 350 m upstream from the Point Wolfe Bridge - pool
- (3) crossing of Rattail Trail - riffle
- (4) crossing of Bennett Brook upstream - riffle
- (5) crossing of Bennett Brook downstream -pool

Time Required: 1 day per station x 5 stations

Staff Required: 4 staff x 5 stations = 20 pds

Equipment Required:
- 4 plastic buckets
- electrofisher and extra battery
- 4 pairs rubber gloves
- 2 dip nets
- baking soda for tranquilliser
- portable electronic scale
- back-up spring scale (100 g)
- measuring board
- scale envelopes
- scale slides
- sharp scalpel
- long boundary nets (1/8" - 1/4" seine nets)
- 4 pairs hip waders, checked for leaks
- recording forms

Technique:
(1) place the boundary nets around the plot site with minimum disturbance. Place local rocks on bottom of net and use stakes to prop up net. Work from outside sampling area, and install upstream net first.
(2) electrofish using one generator and 2 catchers sweeping the entire plot area. All captured fish will be placed in a capture bucket.
(3) sweeps with the electrofisher should proceed across the upstream net first and then back across slightly downstream until the entire plot is covered.
(4) the electrofisher should be turned on in bursts of 5-10 seconds and turned off when moving to a new location.
(5) four sweeps should be made of each plot with a waiting period of 45 minutes between sweeps.
(6) all captured fish will be identified and tranquillised with bicarbonate of soda, weighed to nearest gram and measured from head to fork in tail to nearest millimetre.

(7) a scale sample collected from every 10th juvenile salmon and fork length, and weight recorded on the envelope.
(8) recovered fish should be placed back in the stream just outside of the boundary net.
(9) a theoretical plot size will be established for each plot and marked with permanent steel rebar. This plot size should be based on high er water levels.
(10) sampling plots will be located within permanent theoretical plot boundary. River width at the upper and lower boundary nets and distance between nets will be measured and recorded so that parr densities can be adjusted to available habitat.
(11) a report on adjusted (Theoretical and available habitat) parr densities for each age class should be prepared for each plot.

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